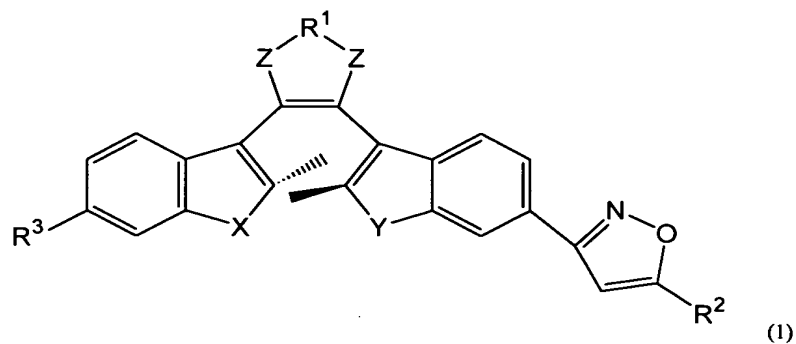


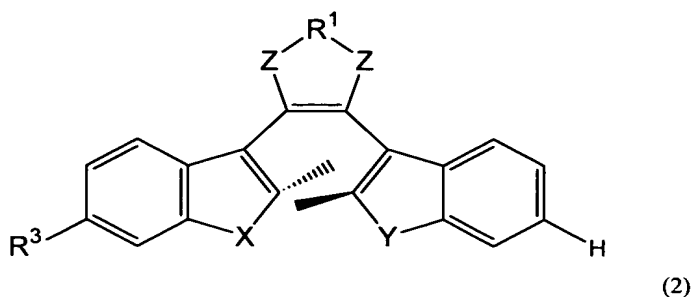
What is claimed is:

1. A photochromic diarylethene compound having isoxazole group expressed in the following formula (1),



wherein R^1 is a direct bond, O, or C_1 - C_3 alkylene optionally substituted with fluoro; R^2 is a hydrogen atom, $(CR^4H)_nOH$ or $C_6(R^5)_mH_l$; R^3 is selected from the group consisting of a hydrogen atom, phenylisoxazole, hydroxymethylisoxazole, acetyl, hydroxy, and phenyl; R^4 is C_1 - C_{10} alkyl; R^5 is chloro, nitro, bromo, or the same as R^4 ; X and Y are independently O, N, or S; Z is methylene optionally substituted with fluoro or carbonyl; and n, m and l are an integer of 1 to 5.

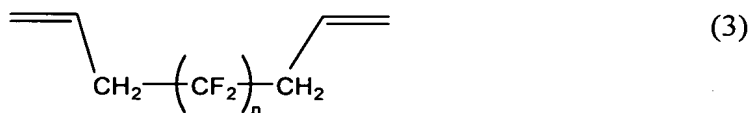
2. A method for preparing said diarylethene compound comprising the steps:
- formylating diarylethene compound of formula (2);
 - reacting the formylated compound with $NH_2OH \cdot HCl$ and aqueous basic solution in series and reacting with N-chlorosuccinimide (NCS); and
 - reacting with acetylene compound substituted with R^2 in the presence of base catalyst,



wherein R¹ is a direct bond, O or C₁-C₃ alkylene optionally substituted with fluoro; R³ is selected from the group consisting of a hydrogen atom, phenylisoxazole, hydroxymethylisoxazole, acetyl, hydroxy, and phenyl; X and Y are independently O, N, or S; and Z is methylene optionally substituted with a fluoro atom or carbonyl.

3. A photochromic diarylethene composition comprising 0.1-90wt.% of the compound of claim 1, 10-89.9wt.% of one or more resin selected from the group consisting of polyolefin, polycarbonate, polymethylmethacrylate, polyester, polyvinyl alcohol, polyurethane, and polyimide, and 10-89.9wt.% of one or more solvent.

4. A photochromic diarylethene composition comprising 0.1-90wt.% of the compound of claim 1, 10-99.8wt.% of fluorinated diacrylate monomer of formula (3), 0-80wt.% of monomer or oligomer having unsaturated group, 0.1-10wt.% of initiator of polymerization selected from thermalpolymerizaition initiator or photopolymerizaition initiator, and 0-90wt.% of one or more solvent,



wherein n is an integer of 0 to 10.

5. The photochromic diarylethene composition according to claim 3, wherein said solvent is selected from the group consisting of acetone, hexane, acetonitrile,

C₁-C₁₀ alcohol, dimethylformamide, tetraalkoxysilane, trialkoxysilane, dialkoxysilane, sulfuric acid, hydrochloric acid, organic acid, dimethylsulfoxide, pyridine, N-methylpyrrolidinone (NMP), sulfolane, α -methylnaphthalene, methoxynaphthalene, chloronaphthalene, diphenylethane, ethylene glycol, quinoline, dichloromethane, dichlorobenzene, dichlorotoluene, propylene carbonate, xylene, methyl ethyl ketone, chloroform, methylene chloride, trichloroethane, trichloroethylene, tetrahydrofuran, 1,4-dioxane and water.

6. The photochromic diarylethene composition according to claim 4, wherein said organic solvent is selected from the group consisting of acetone, hexane, acetonitrile, C₁-C₁₀ alcohol, dimethylformamide, tetraalkoxysilane, trialkoxysilane, dialkoxysilane, sulfuric acid, hydrochloric acid, organic acid, dimethylsulfoxide, pyridine, N-methylpyrrolidinone (NMP), sulfolane, α -methylnaphthalene, methoxynaphthalene, chloronaphthalene, diphenylethane, ethylene glycol, quinoline, dichloromethane, dichlorobenzene, dichlorotoluene, propylene carbonate, xylene, methyl ethyl ketone, chloroform, methylene chloride, trichloroethane, trichloroethylene, tetrahydrofuran, 1,4-dioxane and water.

7. The photochromic diarylethene composition according to claim 4, wherein said unsaturated monomer is selected from the group consisting of methyl methacrylate, butyl methacrylate, styrene, and α -methylstyrene.

8. The photochromic diarylethene composition according to claim 4, wherein said polymerization initiator is selected from the group consisting of benzoyl peroxide, 2,2'-azobisisobutyronitrile, and bis(1,1-dimethylethyl)peroxide, 1-hydroxycyclohexyl phenyl ketone, benzophenone, 2-hydroxy-1-[4-hydroxyethoxy]phenyl]-2-methyl-propanone, 2,2-dimethoxy-2-phenylacetophenone, fluorinated diaryltitanocene, and 2,2-bis(hydroxymethyl)propionic acid.

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- [illegible]